What's So Scary About Rice?

Biotech crops can make drugs—but they must be kept out of the food chain

IN THE HEART OF AMERICA'S rice industry, a fight has broken out between the King of Beers and a tiny biotech company. On one side is Anheuser-Busch, which uses Missouri-grown rice as an ingredient in beer. On the other side is Ventria Biosciences, which is moving to Missouri with plans to cultivate transgenic rice containing human genes. The genes prompt the plant to make two proteins normally found in breast milk, tears, and saliva. The biotech company intends to turn the substances into therapeutic food products to treat stomach disorders.

Anheuser-Busch executives seem to have been struck with indigestion at the thought that human proteins might conceivably crop up in bottles of Bud. Although highly unlikely, such a scenario isn't unheard of: Bioengineered seeds have often turned up in places they don't belong. So Busch vowed to boycott all Missouri rice last April, prompting Ventria to temporarily shelve its plans in the state. "We want to make sure rice growers in Missouri have a good relationship" with one of their biggest customers, concedes Ventria CEO Scott Deeter. Meanwhile, on June 28 the U.S. Agriculture Dept. approved Ventria's application to plant in North Carolina instead.

The strange saga of Ventria and its alien rice casts a pall on a potentially promising area in biotech. Stretched by unprecedented demand for new drugs, biotech companies have been searching for alternatives to traditional manufacturing methods—an expensive process of growing drugs in delicate hosts, such as cells from Chinese hamster ovaries. Plants such as rice and corn may be ideal substitutes because they naturally churn out proteins by the bushel. Getting them to make human varieties is simply a matter of replacing pieces of their genetic code with human genes—just as technicians get hamster cells to produce protein drugs. Then, to ratchet up production, you just plant more acres.

The economic benefits are enticing, too. A traditional biotech factory might cost Ventria CEO Deeter $125 million. With rice, he can get the same output for $4 million—and he intends to pass the savings to consumers. Several other biotech startups are experimenting with drugs grown in plants, and giant Dow Chemical Co. is mulling the idea as well. Consulting firm Frost & Sullivan Inc. predicts the first plant-manufactured drugs will hit the market next year and sprout into a $2.2 billion-per-year industry by 2011.

U.S. RICE
Exports total $1.3 billion annually

PHOTOGRAPH BY ROBERT ESSEL NYC/CORBIS

That's if fears about food safety don't cause plant-grown pharmaceuticals to die on the vine. Consumer and environmental advocates worry that pollen from genetically engineered plants could drift into fields containing food crops and produce contaminated hybrids. But that's not a worry with rice, Deeter insists, because the plant is self-pollinating—each seed contains everything it needs to produce another plant, so there is no risk of transplanted genes leaking to other plants. Still, environmentalists say, there's nothing to prevent a bird from gobbling up the bioengineered seeds and then depositing them, intact, in a field hundreds of miles away. "It's virtually certain this stuff will make it into food-grade rice," says Margaret Mellon, director of the food and environment program for the Union of Concerned Scientists in Washington.

OVERSEAS QUEASINESS

SUCH CERTAINTY IS BACKED up by one particularly horrifying breach that still haunts the food industry. In 2002 drug-producing corn made by ProdiGene Inc. somehow began sprouting in soybean fields near its Nebraska and Iowa sites. The USDA seized 500,000 bushels of soybeans and charged ProdiGene nearly $3 million in fines and disposal costs. Any further gaffes could threaten some $1.3 billion in annual U.S. rice sales to foreign countries, many of which are still queasy about biotech crops—even those tweaked to produce tastier food.

MAP BY ALBERTO MENA/BW

What's needed, Ventria's critics argue, is a tighter regulatory framework to ensure pharma crops stay out of the food supply. As it stands, the USDA is the only federal agency that tightly regulates drug-producing plants grown in outdoor test sites. The Food & Drug Administration generally steps in later, when it's time to decide if the drugs themselves are suitable for human consumption.

Critics say transgenic plants could taint the food supply

Since part of the FDA's mandate is to protect food, critics blast the agency for failing to get involved in biotech plantings from the very beginning. "It's a convoluted process," says Joseph Mendelson, legal director for the Center for Food Safety in Washington, one of many groups calling for the FDA to provide additional oversight on drugs made in plants. An FDA policy adviser says several agencies are looking at whether the system should be changed.

Some biotech outfits have dodged the protesters by avoiding food crops altogether. St. Louis-based Chlorogen Inc. is developing a way to make drugs in tobacco, which grows well in greenhouses, adding an extra barrier against genetic leaks. CEO David N. Duncan says he's not surprised that ProdiGene's mistake continues to reverberate, as Ventria and others manipulate crops that form the very staples of the human diet. "When you start messing with corn flakes and beer, you're going to get in trouble," Duncan says.

Ventria can't seem to escape the controversy. Founded in 1997 in Sacramento, the company planted several small fields of pharma-rice in California. Despite an endorsement from California regulators, some environmentalists and traditional rice farmers cried foul. Earlier this year, Ventria decided to uproot itself and move to the plant-science incubator at Northwest Missouri State University. Deeter says he isn't being chased out of California, but rather he feels Missouri offers more favorable economics for large-scale production.

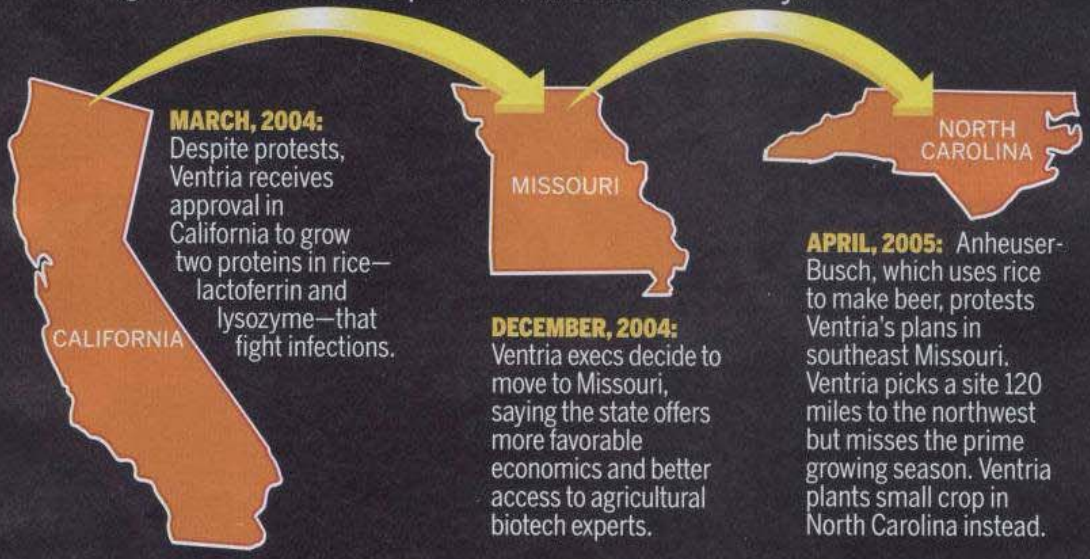
It may be a while before Deeter can realize his dreams of amber waves of humanized grain. In April, Anheuser-Busch lifted its boycott threat after Ventria agreed to move its planned 200 acres from the southeast corner of Missouri to the northwest region of the state—120 miles away from food-grade rice. "We believe Ventria is now sufficiently away from commercial rice producers," says Francine I. Katz, spokesperson for the beer giant. But by the time the compromise was reached, Ventria had missed prime planting season, forcing the company to wait until next year to apply for a USDA permit to plant there. Meanwhile, Ventria planted 75 acres of rice in North Carolina in June, despite threats from the Center for Food Safety, which is considering a lawsuit to curb the company.

Deeter is undeterred. "We fed the world with American agriculture, and now we want to improve the world's health with it," he says. As for those trying to stop him: "They have yet to find a single stomachache as a result of biotech." Perhaps, but unless companies like Ventria and the agencies that regulate them work harder to allay the world's food-safety fears, farmlands won't be fertile ground for drugs.

–By Arlene Weintraub in New York

Kernel Kerfuffle

Ventria Biosciences wants to harvest medicinal human proteins from gene-modified rice plants, but states are leery:



MARCH, 2004: Despite protests, Ventria receives approval in California to grow two proteins in rice—lactoferrin and lysozyme—that fight infections.

DECEMBER, 2004: Ventria execs decide to move to Missouri, saying the state offers more favorable economics and better access to agricultural biotech experts.

APRIL, 2005: Anheuser-Busch, which uses rice to make beer, protests Ventria's plans in southeast Missouri. Ventria picks a site 120 miles to the northwest but misses the prime growing season. Ventria plants small crop in North Carolina instead.

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For more on the Union of Concerned Scientists and its stance on pharmaceutical crops, please visit us online at www.businessweek.com/extras